CLAIMS

1. In a wireless communication system, a method for estimating an original pilot signal, the method comprising:

   receiving a CDMA signal;

   despreading the CDMA signal;

   obtaining a pilot signal from the CDMA signal; and

   estimating an original pilot signal using a pilot estimator that includes more than one filter and that includes a switching method for using the more than one filter, wherein the switching method uses a prediction error, and wherein the pilot estimator provides a pilot estimate.

2. The method as in claim 1, wherein the pilot estimator includes a first Kalman filter and a second Kalman filter.

3. The method as in claim 2, wherein the Kalman filters are implementing Infinite Impulse Response filters.

4. The method as in claim 3, wherein the first Kalman filter provides a first filtered estimate and a first prediction error, and wherein the second Kalman filter provides a second filtered estimate and a second prediction error.

5. The method as in claim 4, wherein the switching method uses the first prediction error and the second prediction error.

6. The method as in claim 5, wherein the switching method uses a first error variance and a second error variance.

7. The method as in claim 6, wherein the pilot estimate is obtained according to the following:

$$\hat{s}^{+}_{k,MSE} = \alpha_1 \hat{s}^{+}_{k}(\theta_1) + \alpha_2 \hat{s}^{+}_{k}(\theta_2)$$

where

$\hat{s}^{+}_{k,MSE}$ is the pilot estimate,

α_1, α_2 are combining coefficients,

$\hat{s}^{+}_{k}(\theta_1)$ is the first filtered estimate, and

$\hat{s}^{+}_{k}(\theta_2)$ is the second filtered estimate.

8. The method as in claim 7, wherein each combining coefficient is obtained through use of a posteriori probabilities function obtained according to the following:

$$f[k] = \ln\frac{\Omega_1}{\Omega_2} - \frac{\hat{\Omega}_2[k]}{\Omega_2} + \frac{\hat{\Omega}_1[k]}{\Omega_1}$$

where

$\hat{\Omega}_1$ is the first error variance, and

$\hat{\Omega}_2$ is the second error variance.

9. The method as in claim 1, wherein the switching method comprises a soft-switching method.

10. The method as in claim 1, wherein the switching method comprises a hard-switching method.

11. The method as in claim 1, wherein the method is implemented in a mobile station.

12. A mobile station for use in a wireless communication system wherein the mobile station is configured to estimate an original pilot signal, the mobile station comprising:

an antenna for receiving a CDMA signal;

a receiver in electronic communication with the antenna;

a front-end processing and despreading component in electronic communication with the receiver for despreading the CDMA signal;

a pilot estimation component in electronic communication with the front-end processing and despreading component for estimating an original pilot signal using a pilot estimator that includes more than one filter and that includes a switching method for using the more than one filter, wherein the switching method uses a prediction error, and wherein the pilot estimator provides a pilot estimate; and

a demodulation component in electronic communication with the pilot estimation component and the front-end processing and despreading component for providing demodulated data symbols to the mobile station.

13. The mobile station as in claim 12, wherein the pilot estimator includes a first Kalman filter and a second Kalman filter.

14. The mobile station as in claim 13, wherein the Kalman filters are implementing Infinite Impulse Response filters.

15. The mobile station as in claim 14, wherein the first Kalman filter provides a first filtered estimate and a first prediction error, and wherein the second Kalman filter provides a second filtered estimate and a second prediction error.

16. The mobile station as in claim 15, wherein the switching method uses the first prediction error and the second prediction error.

17. The mobile station as in claim 16, wherein the switching method uses a first error variance and a second error variance.

18. The mobile station as in claim 17, wherein the pilot estimate is obtained according to the following:

$$\hat{s}^{+}_{k,MSE} = \alpha_1 \hat{s}^{+}_{k}(\theta_1) + \alpha_2 \hat{s}^{+}_{k}(\theta_2)$$

where

$\hat{s}^{+}_{k,MSE}$ is the pilot estimate,

α_1, α_2 are combining coefficients,

$\hat{s}_k^+(\theta_1)$ is the first filtered estimate, and

$\hat{s}_k^+(\theta_2)$ is the second filtered estimate.

19. The mobile station as in claim 18, wherein each combining coefficient is obtained through use of a posteriori probabilities function obtained according to the following:

$$f[k] = \ln\frac{\Omega_1}{\Omega_2} - \frac{\hat{\Omega}_2[k]}{\Omega_2} + \frac{\hat{\Omega}_1[k]}{\Omega_1}$$

where

$\hat{\Omega}_1$ is the first error variance, and

$\hat{\Omega}_2$ is the second error variance.

20. The mobile station as in claim 12, wherein the switching method comprises a soft-switching method.

21. The mobile station as in claim 12, wherein the switching method comprises a hard-switching method.

22. A mobile station for use in a wireless communication system wherein the mobile station is configured to estimate an original pilot signal, the mobile station comprising:

means for receiving a CDMA signal;

means for despreading the CDMA signal;

means for obtaining a pilot signal from the CDMA signal; and

means for estimating an original pilot signal using a pilot estimator that includes more than one filter and that includes a switching method for using the more than one filter, wherein the switching method uses a prediction error, and wherein the pilot estimator provides a pilot estimate.